



CORBA on the Information Power Grid

***Long Term Milestone:* Provide Seamless and Autonomous
Information Power Grid Support to CORBA-Enabled Applications
by 2004.**

Robert Griffin

CORBA IPG WORKSHOP 2001



Globus Components That We Are Providing Access to *via* CORBA

Security







Information

Grid Resources

Access to Secondary Storage



Globus Target Services - Security

-  **Grid Security Infrastructure (GSI)**
 -  **Fundamental Component for *all* Grid-related activities.**
 -  **Proper Authentication Provides Access to Grid Resources, Information, Secondary Storage.**
 -  **Functionality of the "grid-proxy-init" Globus command-line tool.**
 -  **Can be used in tandem with other "Secure" CORBA applications (CORBA-Sec-Enabled).**
 -  **All parts of the CORBA-IPG infrastructure rely on the CORBA GSI service.**



Globus Target Services - Information

- ✍ **Metacomputing Directory Service (MDS)**
- ✍ ***aka* Grid Information Services (GIS)**
 - ✍ **Based on the Lightweight Directory Access Protocol (LDAP)**
 - ✍ **Contains Information for**
 - ✍ **IPG Hosts (Machines) - e.g., Processor Count, Operating System, Host Names**
 - ✍ **Job Queues - Type (LSF, PBS, Fork), Load, Job Status**
 - ✍ **Users and Other Resources**

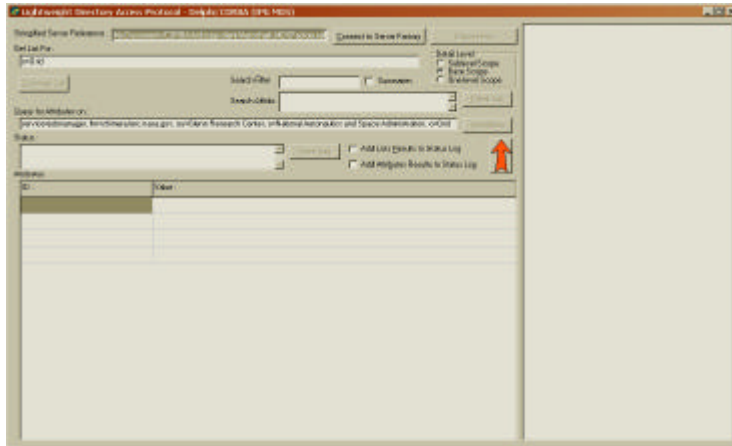


CORBA MDS Service

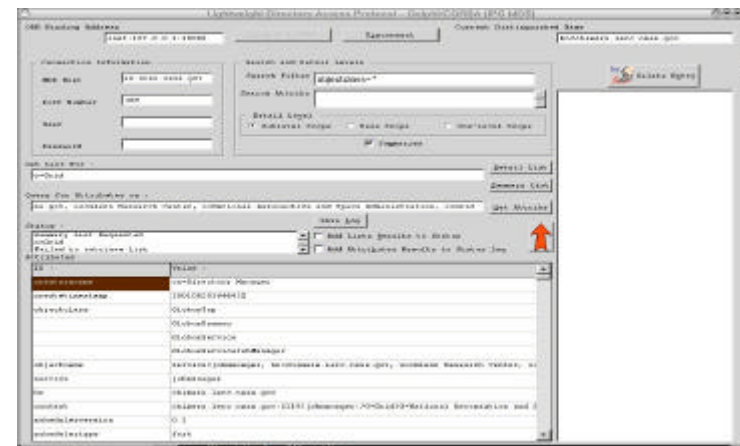
- ✍ **Methods provided by CORBA MDS Application Programming Interface (API) to access an IPG MDS Service**
 - connect** - simple connection to IPG MDS server.
 - disconnect** - disconnect from IPG MDS server.
 - getAttrib** - return a set of Attributes for a given Distinguished Name.
 - getSelectedAttrib** - return a filtered set of Attributes for a given Distinguished Name.
 - getList** - return a list of entries (subordinate values) for a given Distinguished Name.
 - Search** - return a scoped (with or without recursion) list of entries.
 - selectedSearch** - return a scoped and filtered list of entries.



CORBA MDS Applications



Windows Platforms



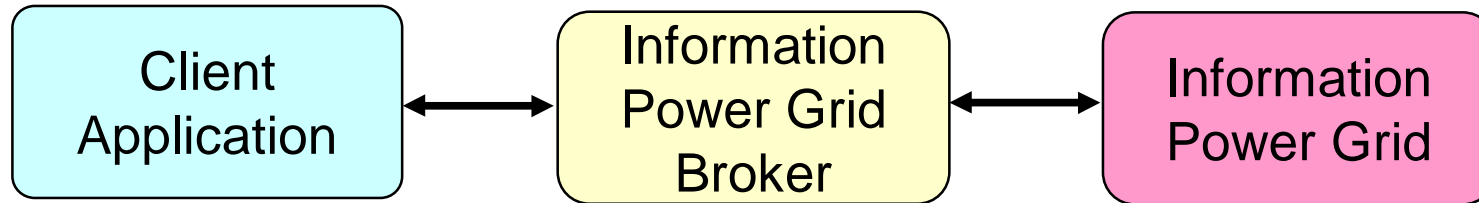
Linux Systems

- ✍ **Windowed applications such as these will serve as the model for future work with IPG Brokers. IPG Brokers may, in turn, be used for Grid-Deployed Processing as the 'hook' into the CORBA-IPG Infrastructure**
- ✍ **Unified Toolkit (*Inprise* Products) allows Reduced Cross-Platform Development Time**
- ✍ **We Are Currently Developing Object-Oriented Procedures To Identify and Classify Grid Computing Resources**

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CORBA-IPG Process Broker System



- ? Client Application needs no knowledge of the Information Power Grid.
- ? The CORBA-IPG Broker submits processing requests to IPG Hosts on behalf of the Client Application.
- ? Target Hosts or Host Services are autonomously chosen by the Broker on the basis on the availability of resources. This information is contained within the Metacomputing Directory Service (MDS).
- ? Results are returned to the Client from the Information Power Grid *via* the CORBA-IPG Broker.



Globus Target Services - Grid Resources

-  **Grid Resource Allocation Manager (GRAM)**
 -  **Responsible for Deploying Execution Requests to Remote Grid Computing Resources.**
 -  **Resource Specification Language (RSL) formalizes the requests for executions on remote machines.**
 -  **Target Functionality contained in "globus-job-run" and similar command line tools.**
 -  **Requires Grid Authentication that is provided by the Grid Security Infrastructure.**



CORBA GRAM Service

- ✍ **Methods provided by CORBA GRAM Application Programming Interface (API)**
 - connect - **simple connection to IPG GRAM server.**
 - disconnect - **disconnect from IPG GRAM server.**
 - SubmitRSL - **Submits a threaded RSL-style job to the GRAMServer.***

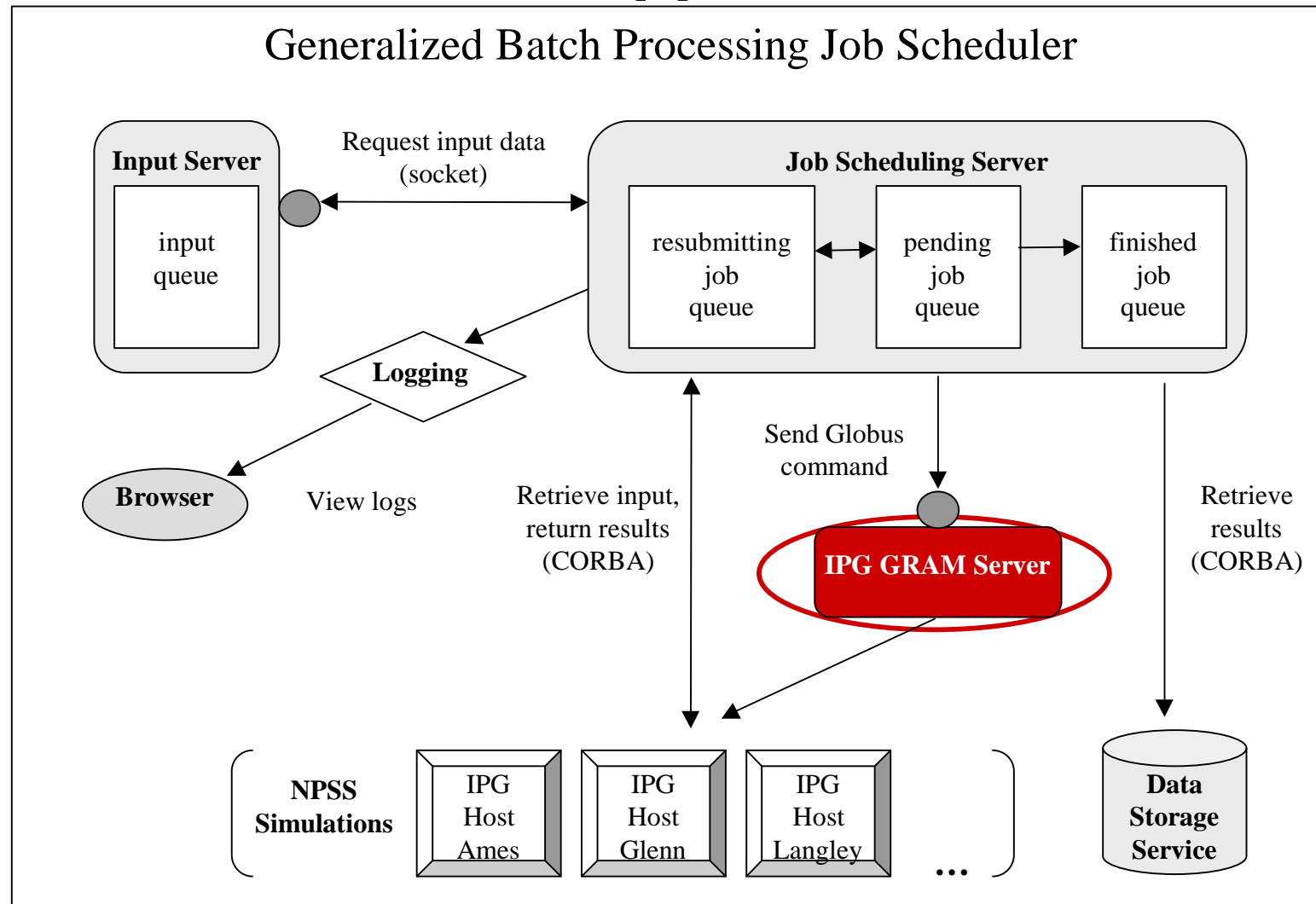
SubmitRSL_noLock - **Submits an unthreaded RSL-Style job.***

SubmitShortJob, SubmitShortIOJob, SubmitLongJob - **Submit threaded Jobs using specifications contained within Short, ShortIO, and Long Job Objects.**

****Threaded Jobs that have been submitted are capable of returning Job Status and remote Job Name information after their submission to the IPG GRAM Server.***



CORBA GRAM Service at Work in Applications



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Globus Target Services – Access to Secondary Storage

- ✍ Grid Access to Secondary Storage (GASS)**
 - ✍ Requires GSSAPI Authentication**
 - ✍ Essential for Automation and Remote Deployments**
 - ✍ Used for Asynchronous File Transfers**
 - ✍ Functionality encapsulated by the command line calls (e.g., “gass-url-copy”)**
 - ✍ GASS Server and Client need to be emulated by CORBA.**
 - ✍ Served First step towards support for the GSIFTP protocol which also provides access to secondary storage *via* FTP**



CORBA GASS Service

Methods provided by CORBA GASS Application Programming Interface (API)

connect - **simple connection to IPG GASS server.**

disconnect - **disconnect from IPG GASS server.**

setSourceURL - **Specify source document for GASS transaction.**

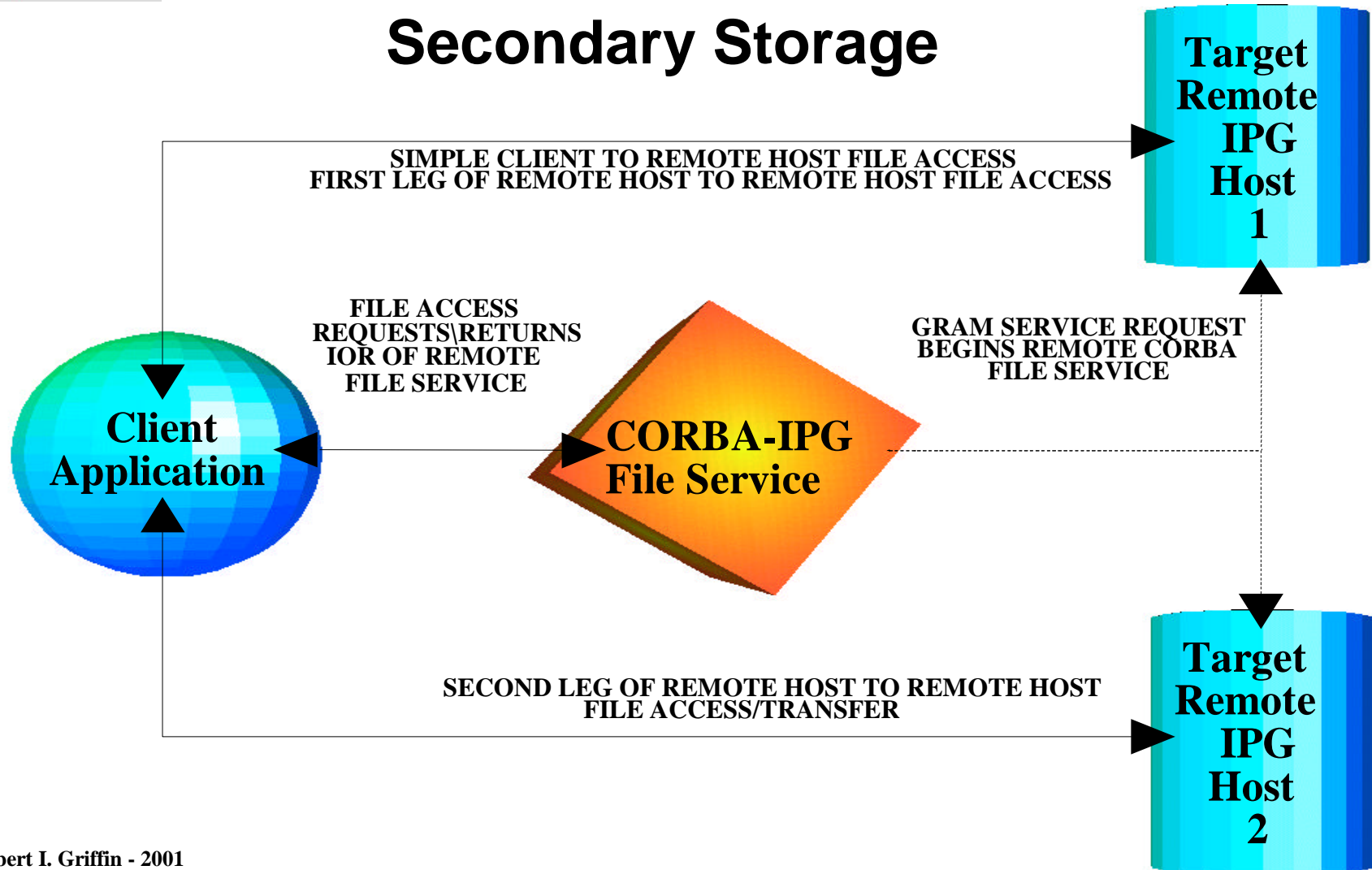
setDestinationURL - **Specify destination document for GASS transaction.**

copy - **perform specified transaction.**

copyLong - **perform transaction takes source and destination URLs as arguments and performs copy in single transaction.**



Prototype Interactions for CORBA-IPG Access to Secondary Storage









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Globus Target Services – Access to Secondary Storage

POSIX File I/O

-  **Secure File Transaction using GSSAPI.**
-  **Currently Synchronous file transfer only**
-  **Represents some portions of the functionality encapsulated by the POSIX-style file manipulation functions.**
-  **POSIXFIO Server transactions are mediated by a Client Side adapter class.**
-  **Integrated in the CORBA-IPG Infrastructure.**
-  **Serves as intermediate step to GSI-FTP CORBA interface.**



CORBA POSIXFIO Service

Methods provided by CORBA POSIXFIO Application Programming Interface (API)*

connect - **simple connection to IPG POSIXFIO server.**

disconnect - **disconnect from IPG POSIXFIO server.**

open - **call for a remote file to be opened.**

close - **call for a remote file to be closed.**

read - **read data from a remote file.**

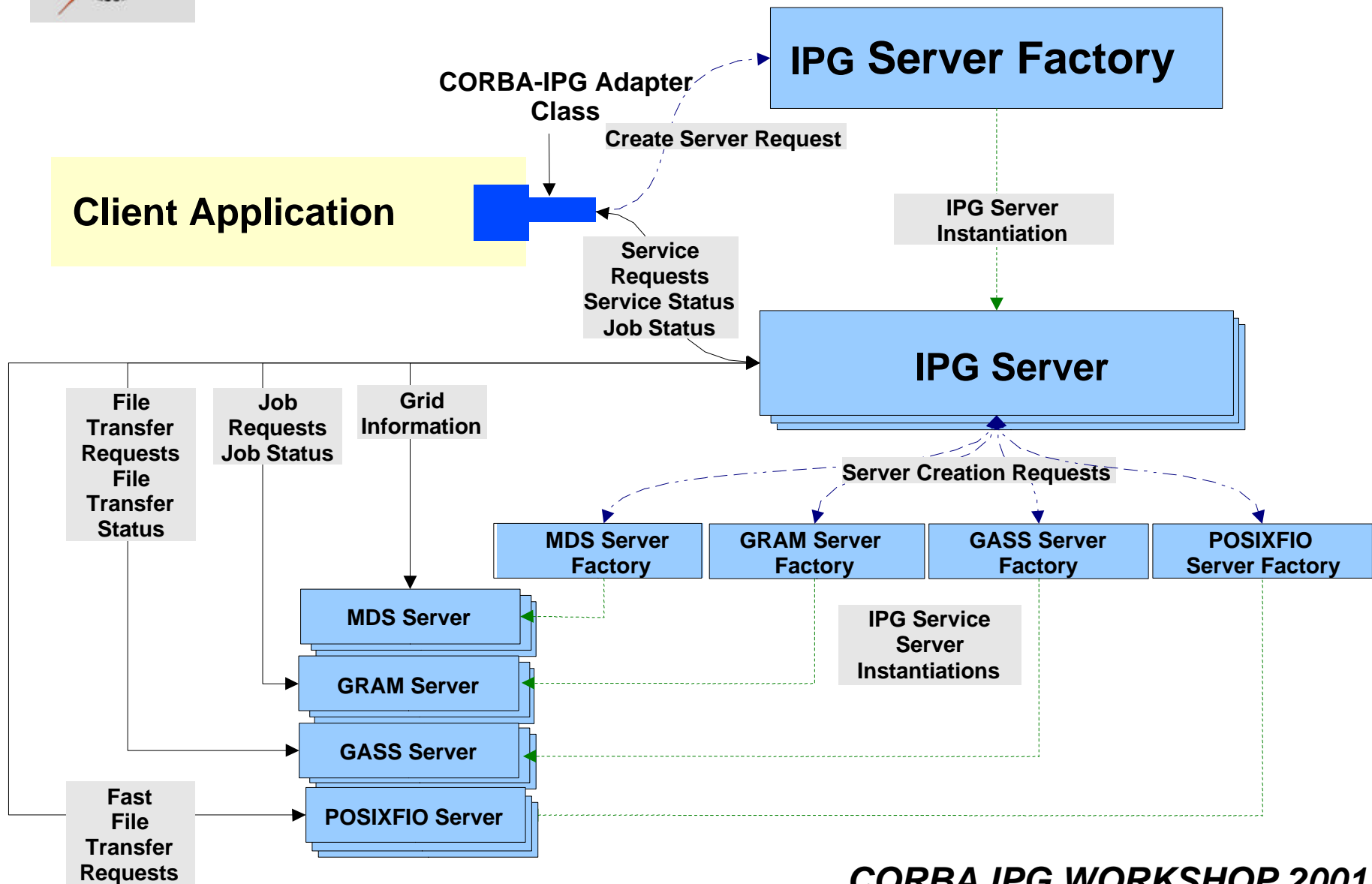
write - **write data to a remote file.**

unlink - **remove a remote file.**

Client-Side Adapter class hides these calls. The Application code uses the function “transfer**” to perform file transactions with remote Information Power Grid resources.*



CORBA-IPG Infrastructure



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Future Directions for the CORBA-IPG Effort

Date	Objective
1/1/2002	Completion of CORBA-Information Power Grid Infrastructure.
4/1/2002	Demonstrate CORBA-IPG based Simple Application Executions (0-D NPSS)
7/1/2002	Inclusion of CORBA Event Services, Naming Service and Implementation Repositories
10/1/2002	Create first CORBA-based IPG Job Brokers
1/1/2003	Maintenance for CORBA-Information Power Grid Infrastructure.
4/1/2003	Load-Balance and Job Optimizations for IPG Job Brokers.
7/1/2003	Demonstrate Integration of Job Results with commercial applications (e.g., Excel)
10/1/2003	Demonstrate Non-NPSS-based CORBA Application on CORBA-Information Power Grid.
2/1/2004	Demonstrate CORBA-IPG based Complex Application Executions (Zoomed NPSS)
6/1/2004	Deploy CORBA-IPG across Multiple Sites
10/1/2004	Offer CORBA-IPG based CAPRI (3D Geometry) services for Higher-Fidelity Component Codes.

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